Farmersville DAC Water Energy Initiative
ATTACHMENT 2
WORKSHEET ASSUMPTIONS PROJECT 2

Project 2: Replace 20,000 square feet of turf with artificial turf at two municipal properties, Farmersville City Hall and the Farmersville Community Center. The City will "lead by example" by replacing water-intensive landscaping with a no-water, low-maintenance alternative.

1. **Baseline Volume of Water for Project**: 0.483 MG/year
   Assumption: The City uses approximately 483,600gallons of water per year to irrigate 20,000 sf of turf at City Hall and the Community Center. This is based on average turf water requirements in the San Joaquin Valley in a typical water year (not excessively wet or dry). Turf requires half of an inch of water two times per week for 39 weeks (nine months) during the year. .31 gallons provides half an inch of water to a square foot.

   Methodology:
   .31 gallons X 20,000 square feet X 2 times per week X 39 weeks=483,600

2. **Volume of Water to be Delivered After Project Implementation** 0.048 MG/year
   Assumption: The City estimates that it will reduce landscape water use by at least 90%. Some water may still be required to maintain trees and small flower beds. However, the most water-intensive turf will be eliminated. Accordingly, water use will be 10% of the previous amount.

   Methodology:
   483,600 X 10%= 48,360

3. **Volume of Hot Water Saved (Electric Heaters)**:
   Hot water will not be reduced as a result of this project.

4. **Volume of Hot Water Saved (GAS Heaters):**
5. **Hot water will not be reduced as a result of this project.**

6. **Useful Life of the Project Assumption: 10 years**

   Assumption: According to the Sythetic Turf Council, the average life expectancy of an aritificial turf field used for sports is 8 years. However, because the turf at City Hall and the Community Center will not be enduring active recreational use, its life expectancy is at least 10-15 years. http://www.syntheticturfcouncil.org/?page=FAQs
7. **Percentage of Imported Water:** 0%
   The City of Farmersville relies exclusively on its high quality local groundwater and does not import any water.

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8. **Energy Intensity of System associated with project water savings: = 1,328.69 KWh/MG**
   Assumption: The KWh Usage per MG is derived from KWh usage for pumping groundwater from the City's 8 wells during the one year period in which 716.6 million gallons were delivered.

		Electricity Utilized At Each Well (KW/h)						
Date	**Gallons Pumped**	**1a**	**3a**	**4a**	**5a**	**6a**	**7a**	**8a**
Apr. 2013	58,078,000	0	0	4,979	0	4,129	19	66,440
May 2013	71,101,400	0	0	7,157	1	712	6,399	79,285
June 2013	84,019,700	0	19,782	2,337	380	269	23,692	69,466
July 2013	91,685,900	0	43,280	150	12,761	18	5,499	54,630
Aug. 2013	83,598,300	0	42,998	309	9	19	5,957	51,722
Sep. 2013	71,595,500	0	43,156	140	8	17	210	53,707
Oct. 2013	58,832,600	1	43,803	124	8	18	30	34,943
Nov. 2013	45,008,800	0	49	212	8	55	667	63,397
Dec. 2013	38,492,900	18	0	165	36	19	19	51,174
Jan. 2014	39,572,300	0	0	120	7	17	498	49,785
Feb. 2014	33,034,000	0	0	444	89	18	864	49,337
Mar. 2014	41,585,500	0	0	145	0	20	1,399	55,022
Total	**716,604,900**	**19**	**193,068**	**16,282**	**13,307**	**5,311**	**45,253**	**678,908**
Total Electric Use all Wells		**952,148 KW/h**						

CALCULATION:
952,148 KW/716.6 MG = 1328.69
The City uses ~1328.69 KW/h of electricity to pump one million gallons of water.

9. **Total Output Emission Rate (default value)**: 0.278 kg CO2e/kWh
   Assumption: Using default value of 0.278 kg CO2e/kWh.

10. **EI associated with Supply and Conveyance**: The City of Farmersville does not import any water. Zero was entered for this value.

Additional Annual Energy Savings: 2,584.63 KWh/year.

11. The project will eliminate the need for mowing at both City Hall and the Community Center. This will reduce the vehicle miles traveled and gasoline utilized to bring mowers to each location and actual mowing at both sites.

Assumptions: Using the U.S. Environmental Protection Agency parameters to convert gasoline savings to kWh (1 therm equals 29.3 KWh):

a. Service trucks used by the City Public Works Department to transport the mowing equipment to the sites utilize approximately 14 miles per gallon.

b. Average heat content per gallon of gasoline is 1.25 therms/gallon.

c. The mileage between the Corporation Yard, City Hall and the Community Center is 5 miles roundtrip.

d. The sites require mowing 52 weeks per year

Distance: 5 miles x 52 weeks = 260 miles annually

e. Truck Fuel use: 260 miles /14 miles per gallon = 18.57 gallons used per year

f. Mower & Equipment (blowers to contain trimmings) Fuel Use: 52 gallons per year

18.57 + 52 = 70.57 gallons x 1.25 therms x 29.3 KWh = 2,584.63 KWh/year.